

Nikon

Stereoscopic Microscope

SMZ-10A

Instructions

This instruction manual describes basic operation of the instrument including cautions. Please read this manual thoroughly before usage and afterwards, keep it near the instrument.

Follow the Instructions Below!

1. Purpose

Use the microscope only for microscopic observation. Do not use it for any other applications.

2. Never take apart

Disassembly may cause severe damage to the instrument. Never take any part apart than that mentioned on this manual. If you notice any malfunction, contact your nearest Nikon representative.

3. Handle gently

Microscope is a precision instrument. Handle it gently. Strong shocks during transportation and/or forcible operations will cause severe damage to the instrument.

4. Place of use

Use the microscope at a place not subjected to vibration, direct sunlight, high temperature and humidity.

5. Avoid dirt on the lens

Do not leave dirt or fingerprints on the lens or mirror surfaces since they deteriorate the microscope image.

6. When using illuminators

Be careful on the following points when using illuminators.

- Confirm that the input voltage indication on the instrument corresponds to your line voltage. If not, contact your nearest Nikon representative. The use of the instrument with the different input voltage indication may cause severe damage to the instrument.
- Lamp and its surroundings become very hot during and right after the illumination. Be careful not to get yourself burnt. Wait sufficiently before exchanging the lamp so that the lamp and its surroundings can cool off.
- Never bring inflammable substances (such as gasoline, petroleum benzine, thinner, alcohol, cloth and paper) near the lamphouse. They might catch fire.
- Use the specified lamp bulbs only. The use of other lamp bulbs may damage the instrument. Refer to the separate instruction manual supplied with the illuminator for the specifications on lamps.
- Before exchanging lamp bulbs, turn OFF the power switch and unplug the power connector to avoid danger of electrical shocks and/or severe damage to the instrument.

This instruction manual describes basic operation of the instrument including cautions. Please read this manual thoroughly before usage and afterwards, keep it near the instrument.

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I. Nomenclature and Function

II. Assembly

III. Usage

IV. Optional Accessories

Care and Maintenance

Nikon reserves the right to make such alterations in design as may be considered necessary in the light of experience. For this reason, particulars and illustrations in this handbook may not conform in every detail to models in current production.

I. Nomenclature and Function

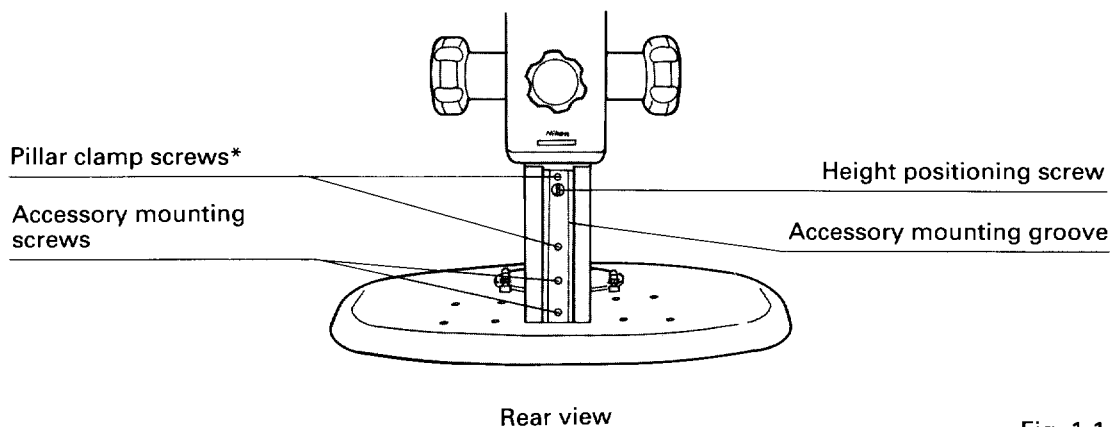
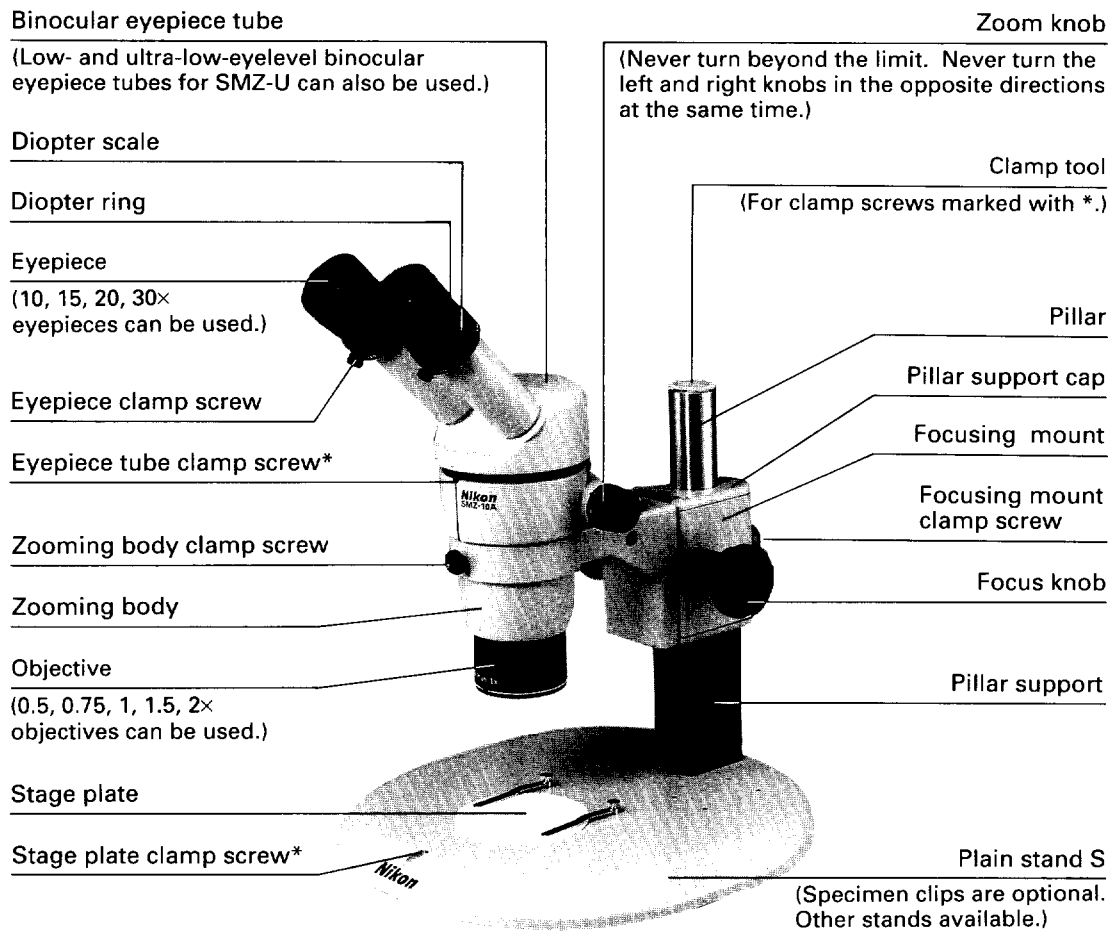


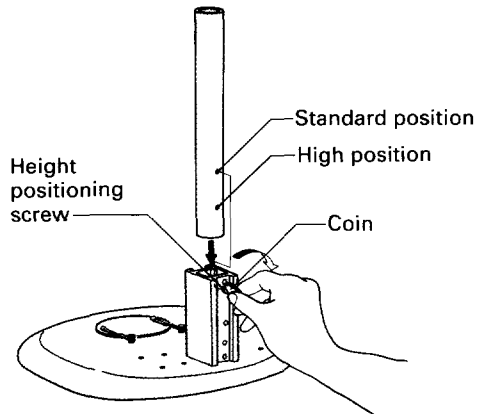
Fig. 1-1

II. Assembly

1

Loosen the height positioning screw by a coin and insert the pillar into the pillar support. Match the upper hole of the pillar with the height positioning screw and tighten the screw. **(Standard position)**

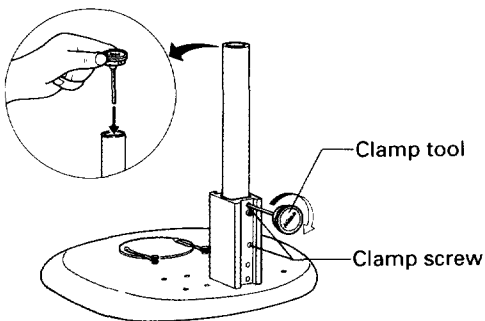
When using 0.5x or 0.75x objectives or when observing specimens with heights, match the lower hole of the pillar with the height positioning screw and tighten the screw. **(High position)** (P.6)



2

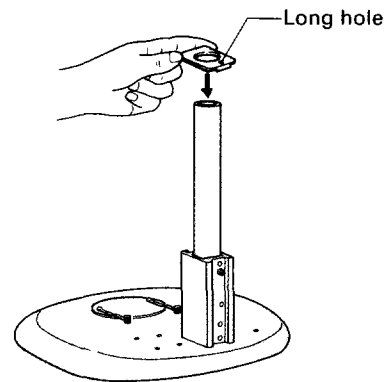
Tighten the pillar clamp screws by the clamp tool.

Clamp tool is used to fix various parts of the instrument. Always keep it at the top of the pillar to avoid loss.



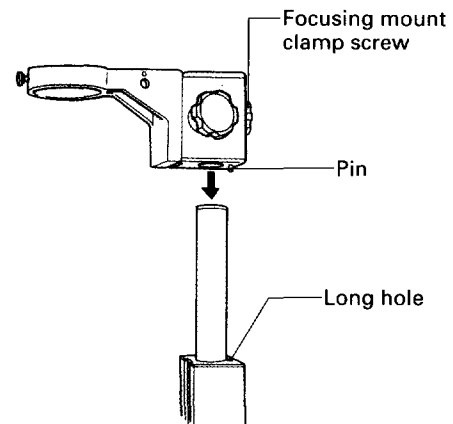
3

Attach the pillar cap with its long hole facing the rear side of the microscope.



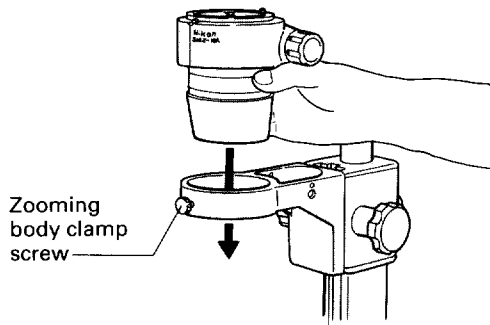
4

Mount the focusing mount so that its positioning pin goes into the long hole on the pillar cap. Tighten the focusing mount clamp screw.



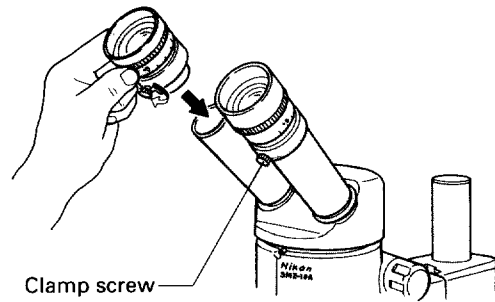
5

Insert the zooming body into the focusing mount and tighten the zooming body clamp screw.



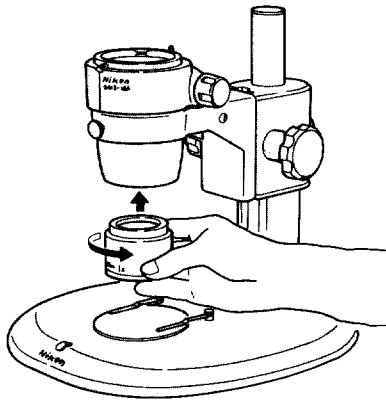
8

Mount the eyepiece with its clamp screw facing down and tighten the clamp screw.



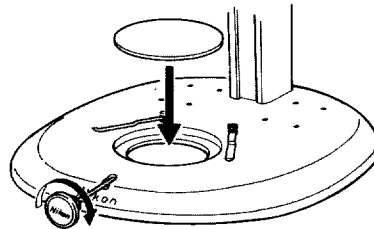
6

Screw on an objective to the zooming body.



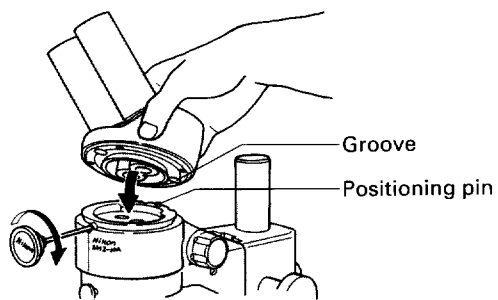
9

Place the stage plate on the base and tighten the clamp screw by the clamp tool.



7

Tilt the binocular eyepiece tube and mount it on the zooming body aligning the groove with the positioning pin on the zooming body.



III. Usage

1. Observation

Place a specimen on the stage plate. Turn the focus knob to focus on the specimen. Turn the zoom knob to zoom in on the image. If the image is out-focused after the zooming operation, perform the diopter adjustment described on Chapter III-4. Use optional illuminators when the image is dark.

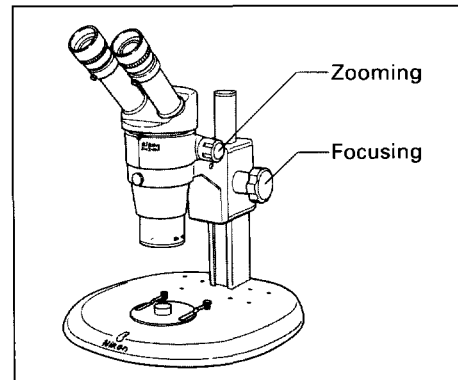


Fig. 3-1

2. Objective and working distance

Use ED Plan objectives only. A pair of magnification rings supplied with the objectives (except for ED Plan 1×), are used exclusively with the stereoscopic microscope SMZ-U. They are not needed on SMZ-10A.

The distance between the upper surface of the specimen and the objective end when the specimen image is in focus, is called the working distance of that objective. The working distance differs by the objective. (See Chart 1.) Generally, the working distance becomes shorter as the objective magnification becomes larger.

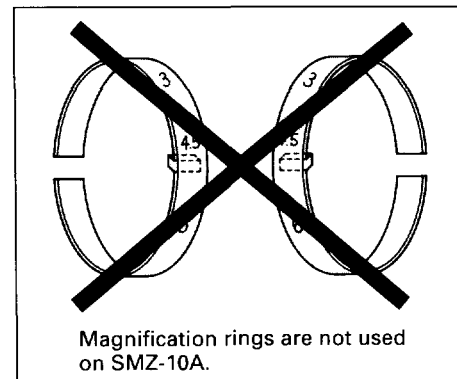


Fig. 3-2

3. When focus knob is too heavy or too light

Turn the left and the right focus knobs in the opposite directions at the same time to change the rotation torque (heaviness) of the focus knobs. Do not make it too loose since the zooming body may drop down by its own weight.

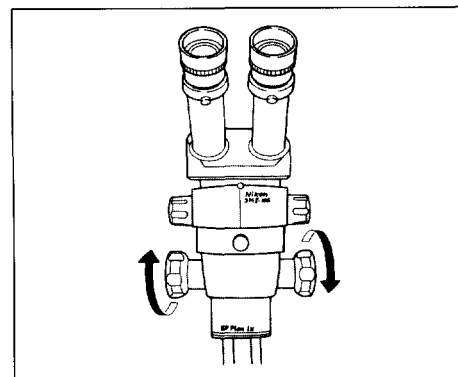
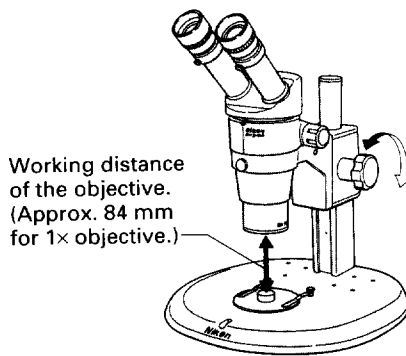


Fig. 3-3

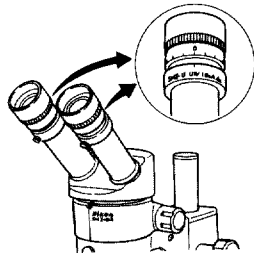
4. Diopter adjustment

This adjustment compensates observer's eyesight. Perform adjustment for both eyes since the eyesight usually differs on each eye. After the correct adjustment, the image is kept focused regardless of the zooming operation.

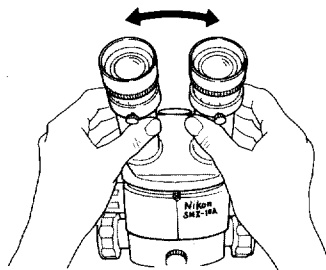
- 1**
Place a specimen on the stage plate. Turn the focus knob until the distance between the objective end and the upper surface of the specimen becomes approximately the working distance of the objective.
The working distance differs by the objective. Look them up on Chart 1 at the end of this instruction manual. (Also refer to Chapter III-2 on working distances.)



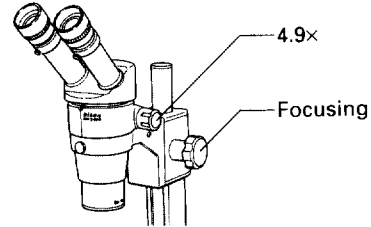
- 2**
Set the diopter scale on each objective to "0".



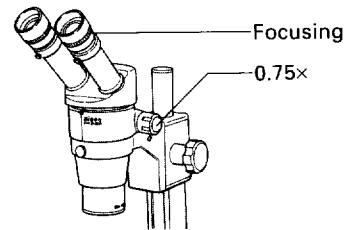
- 3**
Adjust the interpupillary distance.



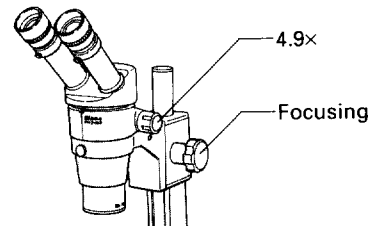
- 4**
Set the zoom knob to "4.9x". Turn the focus knob to focus on the specimen image.



- 5**
Set the zoom knob to "0.75x". Look into the right eyepiece with the right eye. If the image is out-focused, turn the diopter adjustment ring on the right eyepiece to focus on the image.



- 6**
Return the zoom knob to "4.9x". Look into the right eyepiece with the right eye. If the image is out-focused, turn the focus knob to focus on the image.



- 7** Repeat the above steps 5 and 6 until the image is kept focused regardless of the zoom knob position (4.9x or 0.75x).

- 8** Perform the diopter adjustment for the left eye in the same manner as above 4, 5, 6 and 7. (Use left eye, left eyepiece and left diopter adjustment ring.)

5. When using reticles

Specimen images can be observed through the reticles for SMZ-U (optional) or the reticles that you own. (The size of the reticles that can be used differs by the eyepiece. Check the Chart 1 at the end of this instruction manual.)
Screw off the viewfield ring from the eyepiece. Screw on the reticle for SMZ-U instead, or place your reticle on the viewfield ring with the marked surface facing down and return the viewfield ring back on the eyepiece.

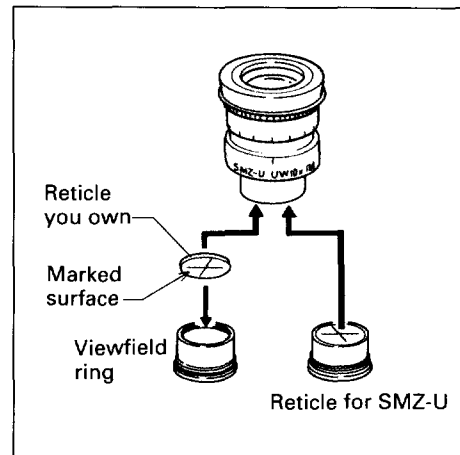


Fig. 3-5

6. When observing specimen with height

When observing specimen with height, distance between the upper surface of the specimen and the objective end may turn out to be shorter than the working distance of the objective. If this happens, loosen the focusing mount clamp screw and slide up the focusing mount to the upper side of the pillar.

If the stroke is yet short, reset the pillar to the high position which makes the pillar 43mm taller. (See page 2.)

The use of extension pillar (optional) extends the height for 123mm compared to the standard position of the standard pillar.

See Chart 2 at the end of this instruction manual for the objectives and their maximum observable height of the specimen.

Notes

- Firmly tighten the clamp screw to avoid focusing mount dropping down by its own weight.
- When 0.5x or 0.75x objective is used, pillar must be set at its high position or the extension pillar must be used, since the working distance is not obtained by the standard position.

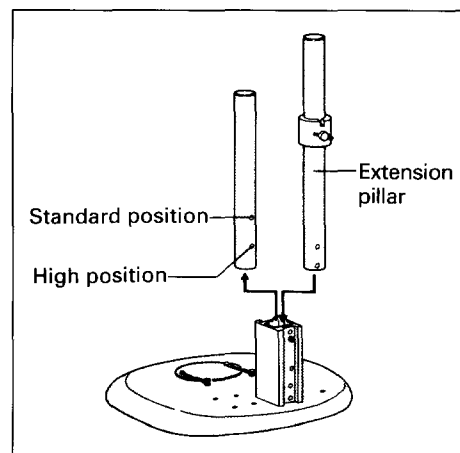


Fig. 3-6

IV. Optional Accessories

Refer to the separate instruction manual when using optional accessories.

1. Photomicrography and TV monitoring

Mount the beam splitter (optional) between the zooming body and the binocular eyepiece tube for photomicrography and TV monitoring.

Total magnification for photomicrography will be "the magnification of PL projection lens" multiplied by "the magnification of zoom knob".

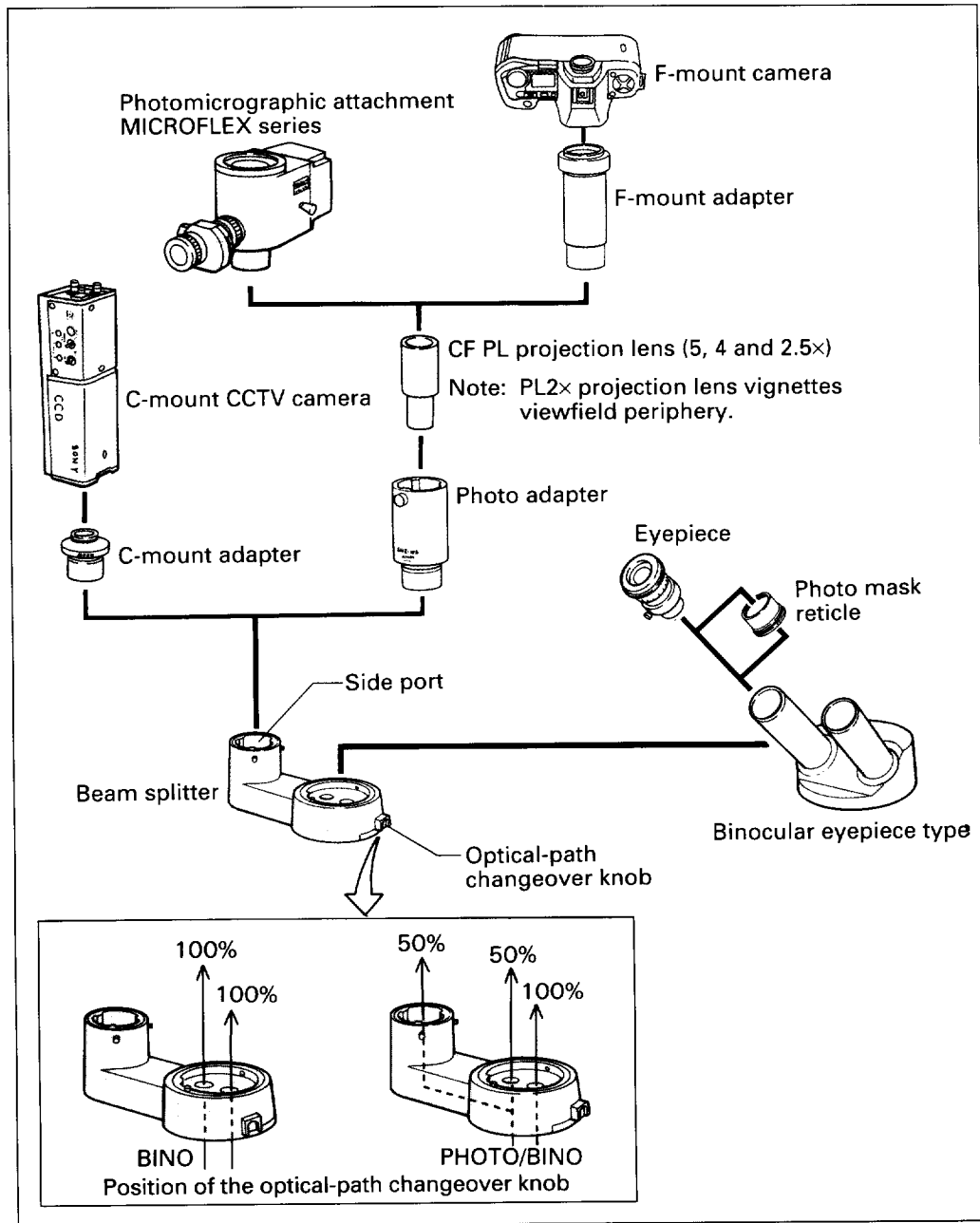


Fig. 4-1

1) Attaching beam splitter

The side port of the beam splitter can be brought either to the right or the left. Tilt the beam splitter and mount it on the zooming body so that its groove aligns with the positioning pin on the zooming body. Tighten the clamp screw.

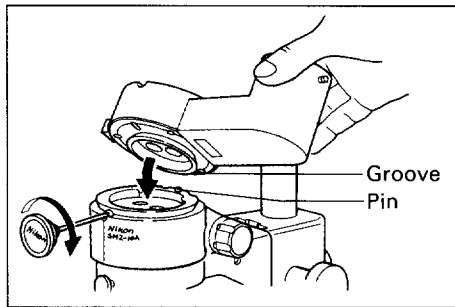


Fig. 4-2

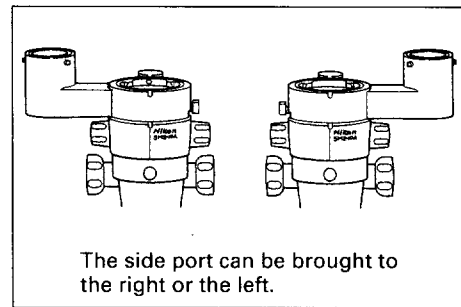


Fig. 4-3

2) Photo mask reticle

On photomicrography, images should be focused on the film surface. If focusing is to be performed from the eyepiece, attach the photo mask reticle (optional) to the eyepiece. For more accurate focusing, use focusing magnifier (optional) instead. You can also perform focusing through the finder of the photomicrographic attachment. As shown in the following figure of the photo mask reticle, use the different frames according to the projection lens used. If you must determine the accurate area to be photomicrographed, check the frame on the finder of the photomicrographic attachment.

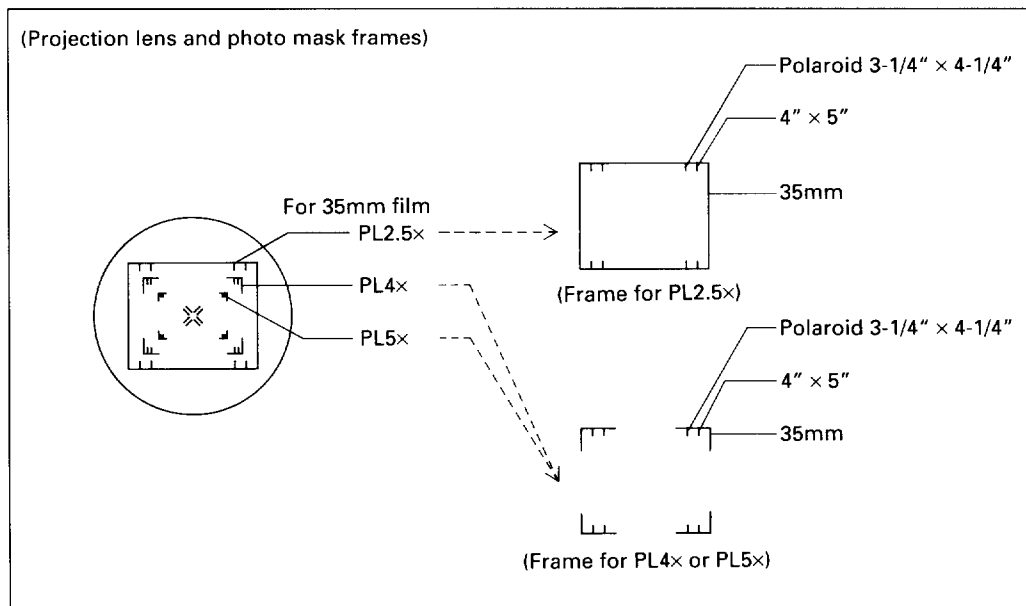


Fig. 4-4

3) Photomicrographic procedure

① Set the optical path.

Set the optical-path changeover knob to the PHOTO/BINO side.

② Adjust brightness.

On color photomicrography, brightness of the illumination strongly affects the color balance of the picture. Refer to the instruction manual supplied with the illuminator to adjust the brightness for the best result.

- When using plain stand D2: Turn the brightness control dial to the maximum and adjust by the color balance filter.
- When using transformer XN: Set the brightness control dial to 6V.

③ Focus

The following is the focusing procedure using photo mask reticle. Refer to the separate instruction manual supplied with the photomicrographic attachment when performing focusing through the finder on the photomicrographic attachment.

- (1) Remove the viewfield ring from the eyepiece and screw on the photo mask reticle instead.
- (2) Turn the diopter adjustment ring to focus on the photo mask.
- (3) Turn the focus knob to focus on both the specimen image and the photo mask.

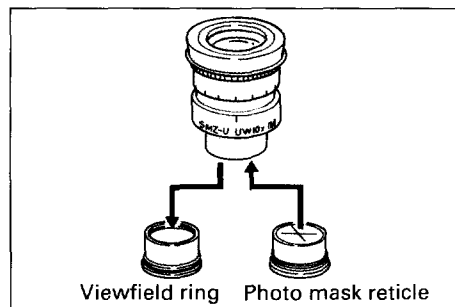


Fig. 4-5

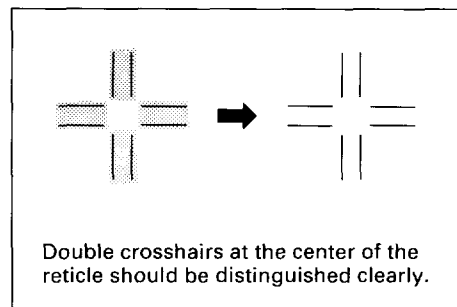


Fig. 4-6

④ Adjust frame.

Turn the eyepiece to match the direction of the frame with the frame seen inside the finder of the photomicrographic attachment.

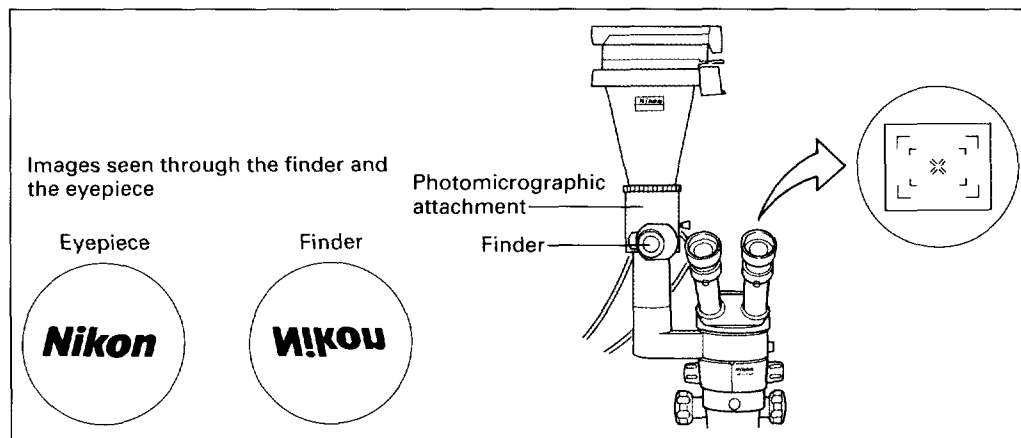


Fig. 4-7

2. Coaxial episcopic illuminator

Coaxial episcopic illuminator (optional) can be mounted between the zooming body and the binocular eyepiece tube. Transformer XN (optional), plain stand D2 (optional) or diascopic bright-/darkfield stand 2 (optional) is needed as the power source.

Use the specified halogen lamp bulbs only (6V-20W PHILIPS 7388). If the lamp bulb other than that specified is used, instrument may be severely damaged.

Coaxial episcopic illuminator itself has the magnification of 1.5x. Do not forget to include this magnification when calculating the total magnification of the instrument.

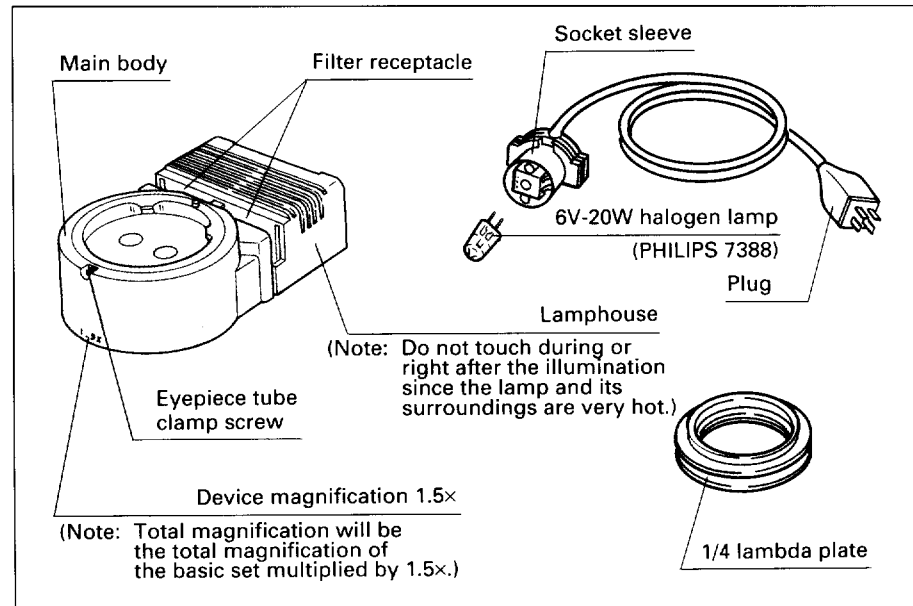


Fig. 4-8

1) Cautions

- When coaxial episcopic illuminator is used, the zooming magnification should be limited to those mentioned on the following chart to avoid uneven illumination.

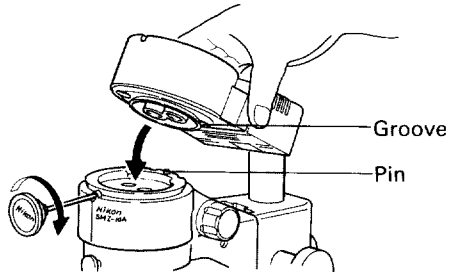
Objective	0.5x	0.75x	1x	1.5x	2x
Zooming Magnification	More than 3x	More than 2x	More than 1.5x	More than 3x	Cannot be used

- Use 6V-20W halogen lamps (PHILIPS 7388) only. Never use other lamps since they might damage the instrument.
- Lamp and its surroundings become very hot during and right after the illumination. Wait sufficiently before exchanging the lamp bulb so that the lamp and its surroundings can cool off.
- Do not touch the glass part of the lamp bulb with bare hands. Wear gloves or keep the protecting cover on the bulb during installation. Wipe off any fingerprints or stains using clean cloth moistened with pure alcohol since those burned on the bulb surface will decrease brightness and cause lamp breakage.

2) Attaching coaxial episcopic illuminator

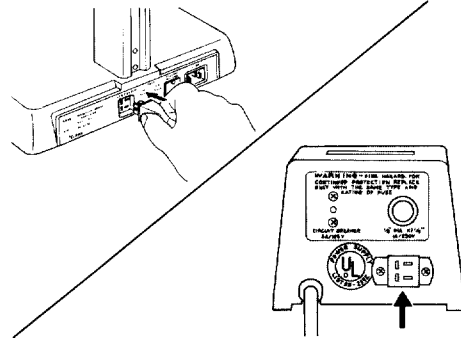
1

Tilt the coaxial episcopic illuminator and mount it on the zooming body so that its groove aligns with the positioning pin on the zooming body. Tighten the clamp screw. (When using the beam splitter at the same time, mount it on the coaxial episcopic illuminator)



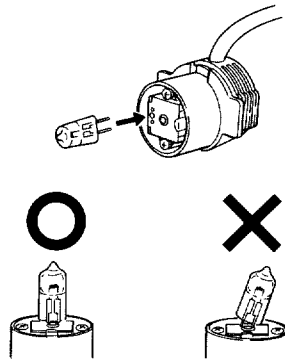
4

Insert the plug of the socket sleeve into the connector of the transformer XN (optional), plain stand D2 (optional) or the diascope bright-/darkfield stand 2 (optional).



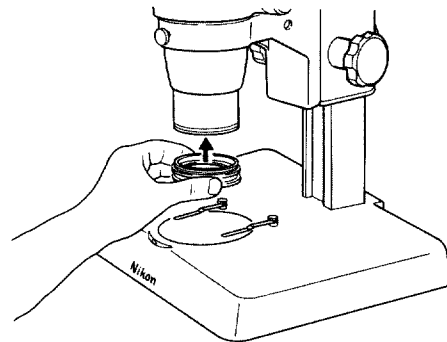
2

Insert 6V-20W halogen lamp straight into the socket sleeve.



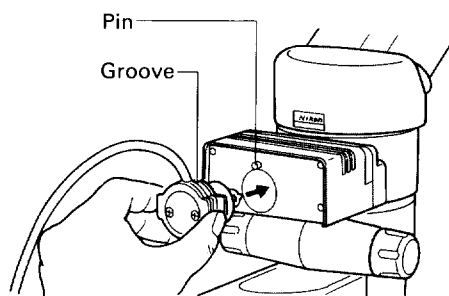
5

Screw on the 1/4 lambda plate to the objective end.



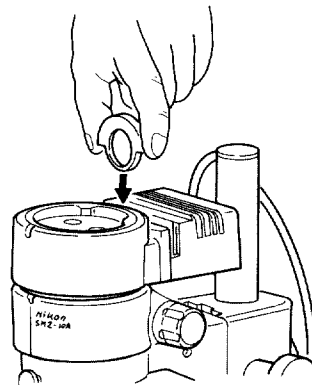
3

Insert the socket sleeve into the lamphouse matching its groove with the pin on the lamphouse.



6

Filters can be inserted into the illuminator if necessary.



3) Using coaxial episcopic illuminator

① **Turning the lamp ON/OFF.**

Turning ON the power switch of the transformer XN, plain stand D2 or diasopic bright-/darkfield stand 2 lights the lamp. Turn the brightness control dial to adjust the brightness. Turning OFF the power switch distinguishes the lamp.

② **Centering the lamp.**

Turn the focus knob to elevate the zooming body to the top. Turn the zoom knob to the maximum magnification. Place a white sheet on the stage plate (or just use the white side of the stage plate). Adjust the position of the lamp socket sleeve by rotating it or pulling it in or out of the lamphouse to make the left and right illumination even, uniform and brightest.

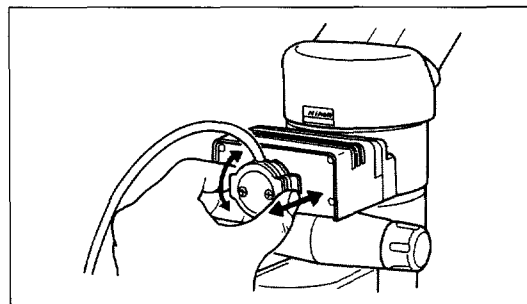


Fig. 4-9

③ **Adjusting 1/4 lambda plate.**

Rotate the 1/4 lambda plate to switch the brightness of the illumination by each 45°. Bring the white dot on the knurled ring to the front to make the illumination brightest. The optical axis of the 1/4 lambda plate is at the 45° position from the white dot.

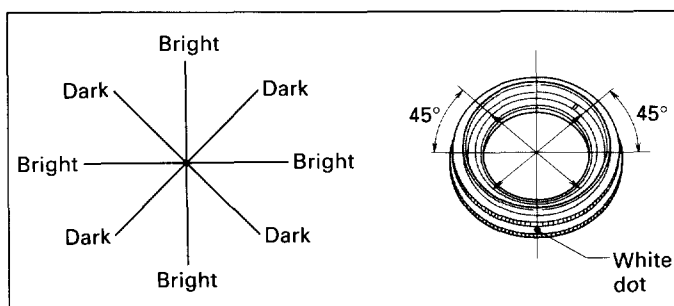


Fig. 4-10

3. Other illuminators

The following illuminators (optional) can be used with SMZ-10A. Refer to the separate instruction manual supplied with each illuminator for details.

- Epi-illuminator (6V-20W)
- Fiber optics bifurcated illuminator for stereoscopic microscopes
- Fiber optics ring illuminator for SMZ-U

4. Stands

The following stands (optional) can be used with SMZ-10A. For the stands other than plain stand S, remove the spacer at the top of each pillar. Refer to the separate instruction manual supplied with each stand for details.

- Plain stand S for stereoscopic microscopes
- Plain stand D2 for stereoscopic microscopes
- Diascopic stand 2 for stereoscopic microscopes
- Diascopic bright-/darkfield stand 2 for stereoscopic microscopes

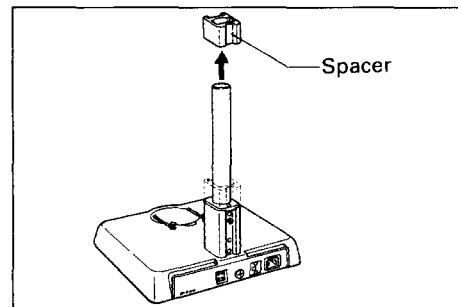


Fig. 4-11

5. 4×4 stage adapter

The following stages (optional) for OPTIPHOT series can be mounted on the plain stage S or D2 by using 4×4 stage adapter (optional) in place of the stage plate.

(Note: 4×4 stage adapter cannot be mounted on the diascopic illuminator stand 2 or the diascopic bright-/darkfield stand 2.)

- 4×4 stage for OPTIPHOT series
- Mechanical stage for OPTIPHOT series
- Rotating stage for OPTIPHOT series

Use pillar A for 0.5× or 0.75× objectives

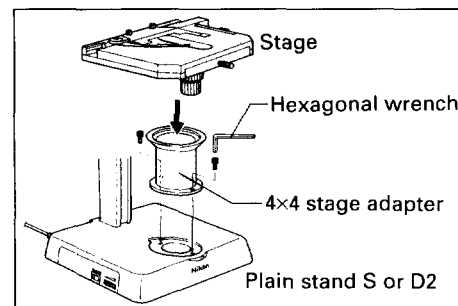


Fig. 4-12

6. Teaching head

Refer to the separate instruction manual supplied with the teaching head (optional) and the large base stand (optional) for SMZ-U for the details. When using epi-illuminator, attach it to the large base stand.

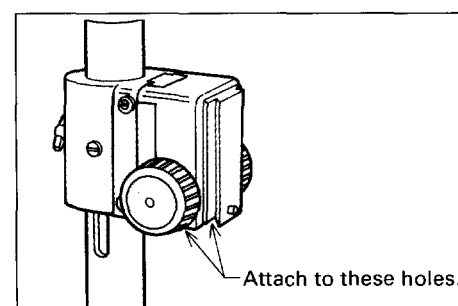


Fig. 4-13

7. Iris diaphragm

Focus depth and brightness can be controlled by the iris diaphragm (optional) attached between the zooming body and the binocular eyepiece tube. When using coaxial episcopic illuminator (optional) at the same time, attach the episcopic illuminator on the iris diaphragm.

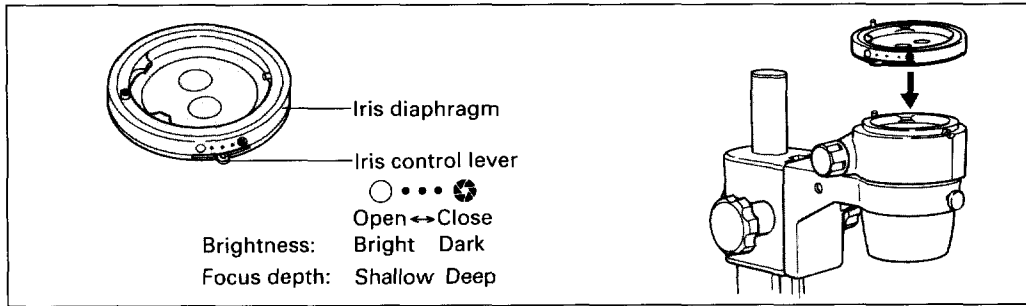


Fig. 4-14

8. Polarizing plates

When using diascope illumination stand 2 (optional) or the diascope bright-/darkfield stand 2 (optional), polarizing plates (optional) can be attached to enable the polarizing observation. Attach the polarizer under the glass stage plate and the analyzer to the objective end. (Note: Polarizing plates cannot be used with 2x objective.)

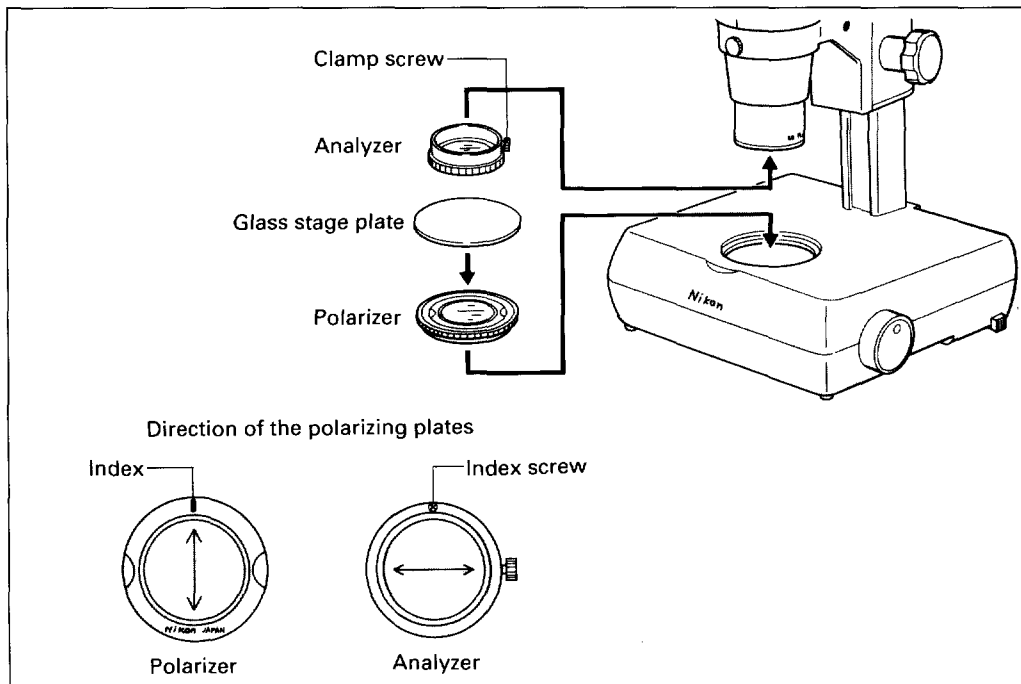


Fig. 4-15

Care and Maintenance

1. Cleaning lenses

- Dust is best removed with a soft brush or gauze.
- More persistent dirt, such as fingerprints, grease and oil, may be removed with soft cotton, lens tissue, or gauze lightly moistened with absolute alcohol (ethyl alcohol or methyl alcohol).
- Absolute alcohol are quite inflammable. Be very careful with fire.

2. Cleaning painted or plastic surfaces

- Avoid use of any organic solvents (such as alcohol, ether, thinner, etc.) to clean the painted or plastic surfaces of the instrument. We recommend the use of silicon cloth. More persistent dirt may be cleaned with mild detergent solution.
- Printed plastic surfaces should be cleaned only by soft cloth moistened with water.

3. When not in use

When the microscope is not in use, store it in a dry place not subjected to mold.

4. Periodical inspection

To maintain the performance of the microscope, periodical inspection is recommended. (Contact your nearest Nikon representative for details.)

Chart 1 Magnification, Real Viewfield and Working Distance

		Objective Viewfield (Reticle Diameter)				
		UW10x 24 (dia.25)	UW15x 17 (dia.25)	UW20x 15 (dia.21)	UW30x 7 (Note 3)	
Objective W.D./Color Code	ED Plan 0.5x 155/Red	Total Mag.	3.75 to 24.5x	5.63 to 36.8x	7.5 to 49x	11.25 to 73.5x
		Real Viewfield	64.0 to 9.8	45.3 to 6.94	40.0 to 6.12	18.6 to 2.84
	ED Plan 0.75x 117/Yellow	Total Mag.	5.63 to 36.8x	8.44 to 55.1x	11.25 to 73.5x	16.9 to 110.3x
		Real Viewfield	42.63 to 6.53	30.2 to 4.63	26.64 to 4.08	12.43 to 1.89
	ED Plan 1x 84/White	Total Mag.	7.5 to 49x	11.25 to 73.5x	15 to 98x	22.5 to 147x
		Real Viewfield	32.0 to 4.9	22.7 to 3.47	20.0 to 3.06	9.3 to 1.42
	ED Plan 1.5x 50.5/Green	Total Mag.	11.25 to 73.5x	16.9 to 110.3x	22.5 to 147x	33.75 to 220.5x
		Real Viewfield	21.33 to 3.27	15.11 to 2.31	13.33 to 2.3	6.22 to 0.95
	ED Plan 2x 40/Blue	Total Mag.	15 to 98x	22.5 to 147x	30 to 196x	45 to 294x
		Real Viewfield	16.0 to 2.45	11.33 to 1.74	10.0 to 1.53	4.67 to 0.71

Unit: mm

Note 1: The color of the magnification ring is the same as the color code of the objective.

Note 2: Use the reticle thinner than 1.5 mm.

Note 3: Contact your nearest Nikon representative for the reticle attachment to 30x objective.

Chart 2 Observable specimen height

	Objective				
	ED Plan 0.5x	0.75x	1x	1.5x	2x
Standard Position	23.5	67	103	112	112.5
High Position	66.5	110	146	155	155.5
Extension Pillar	146.5	190	226	235	235.5

Unit: mm

Note 1: Maximum observable height of the specimen when the focusing mount is fixed at the highest point on the pillar.

Note 2: The instrument becomes top-heavy when focusing mount is fixed at the high point on the pillar. Be very careful when mounting photomicrographic attachment or TV camera on the SMZ-10A.